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REVIEW ON TOBACCO AND ORAL SQUAMOUS CELL CARCINOMA ON MANAGEMENT/ CONTROL OF MOUTH CANCER

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ABSTRACT

Oral Squamous Cell Carcinoma (OSCC) is one of the most common forms of mouth cancer, strongly associated with tobacco consumption in both smoking and smokeless forms. The uncontrolled growth of abnormal cells in the oral cavity not only damages local tissues but can also spread to distant organs through blood and lymphatic systems, leading to life-threatening conditions. Tobacco use remains the most preventable cause of oral cancer, yet it continues to contribute significantly to cancer-related morbidity and mortality worldwide. This review focuses on the link between tobacco and OSCC, highlighting its pathogenesis, risk factors, and health burden.

KEYWORDS: Tobacco and nicotine pharmacokinetics, Oral cancer epidemiology, Tobacco-induced carcinogenesis , Mouth cancer management.

I. INTRODUCTION

Cancer is one of the leading causes of death worldwide, and among its many types, Oral Squamous Cell Carcinoma (OSCC) is one of the most serious health problems. OSCC begins in the lining of the mouth and often spreads to nearby tissues and organs if not treated in time. A major cause of this cancer is the use of tobacco, either in the form of smoking or chewing. Nicotine and other harmful chemicals present in tobacco damage the cells of the mouth, leading to abnormal growth and, over time, the development of cancer.

Tobacco-related oral cancer is especially common in countries like India, where chewing tobacco, gutkha, and smoking are widely practiced. What makes this issue even more concerning is that tobacco use is preventable, yet it continues to cause thousands of deaths every year. Along with tobacco, factors such as alcohol consumption, poor oral hygiene, and genetic predisposition can increase the risk of OSCC.

Early detection of oral cancer can save lives, but many cases are identified only in the advanced stages when treatment becomes difficult. Management of mouth cancer involves surgery, radiation, chemotherapy, and, in some cases, the use of herbal and alternative therapies. At the same time, strong preventive actions such as awareness campaigns, government regulations, and lifestyle changes are necessary to reduce the burden of tobacco-related cancers.

This review paper focuses on the connection between tobacco and OSCC, discussing how tobacco contributes to cancer, the challenges in its management, and possible solutions for better prevention and control.

II. ETIOLOGY

The primary cause of Oral Squamous Cell Carcinoma (OSCC) is long-term tobacco use in both smoking (cigarettes, bidis) and smokeless forms (gutkha, khaini, betel quid with tobacco). Nicotine and carcinogenic chemicals such as nitrosamines directly damage the DNA of oral epithelial cells, leading to mutations and uncontrolled growth.

Other contributing factors include alcohol consumption, poor oral hygiene, viral infections like HPV, and genetic susceptibility. In India and other developing countries, chewing tobacco combined with areca nut further increases the risk of OSCC.

Thus, the etiology of mouth cancer is multifactorial, but tobacco remains the most preventable and dominant risk factor.

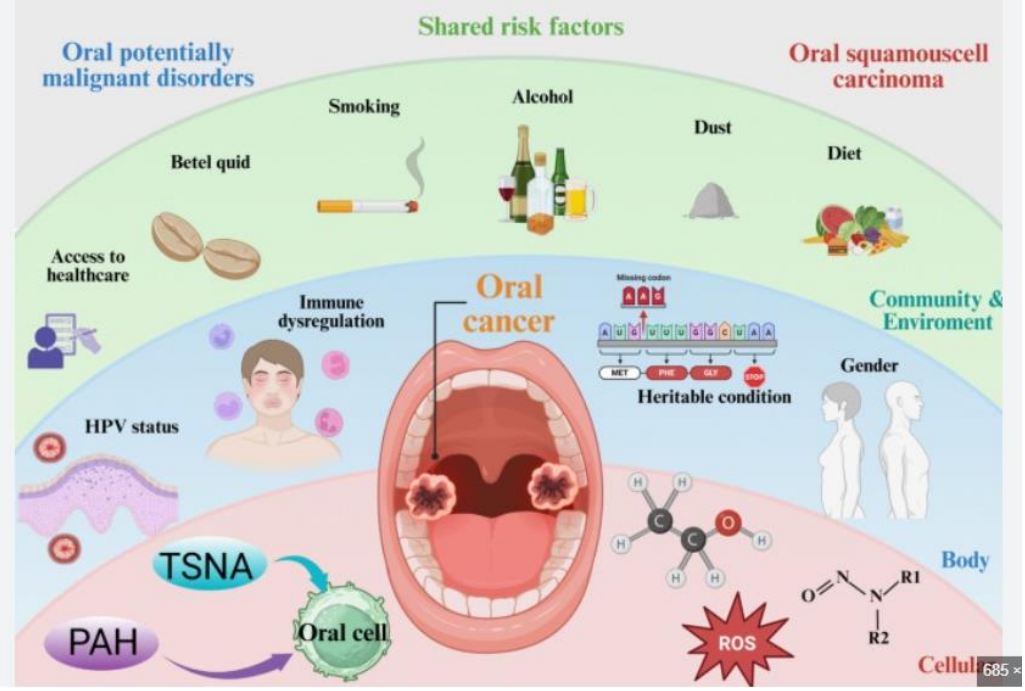

Diagram: Oral squamous cell carcinoma : Insights into cellular heterogeneity.

III. PATHOPHYSILOGY

When tobacco (smoked or chewed) enters the body, it releases harmful chemicals such as **nicotine, nitrosamines, and tar**. These carcinogens directly interact with the cells lining the mouth. Over time, they cause **DNA damage and genetic mutations** in the oral epithelial cells.

The damaged cells lose their normal control of growth and begin to **divide uncontrollably**. This uncontrolled cell division forms precancerous lesions (like leukoplakia or erythroplakia), which may gradually transform into Oral Squamous Cell Carcinoma (OSCC).

Along with this, tobacco reduces the effectiveness of the body's immune system and promotes chronic inflammation, creating a favorable environment for cancer development. If untreated, these cancerous cells invade deeper tissues, spread to lymph nodes, and may metastasize to distant organs.

Thus, the pathophysiology of OSCC shows how continuous tobacco exposure leads to cellular injury, mutation, and ultimately malignant transformation.

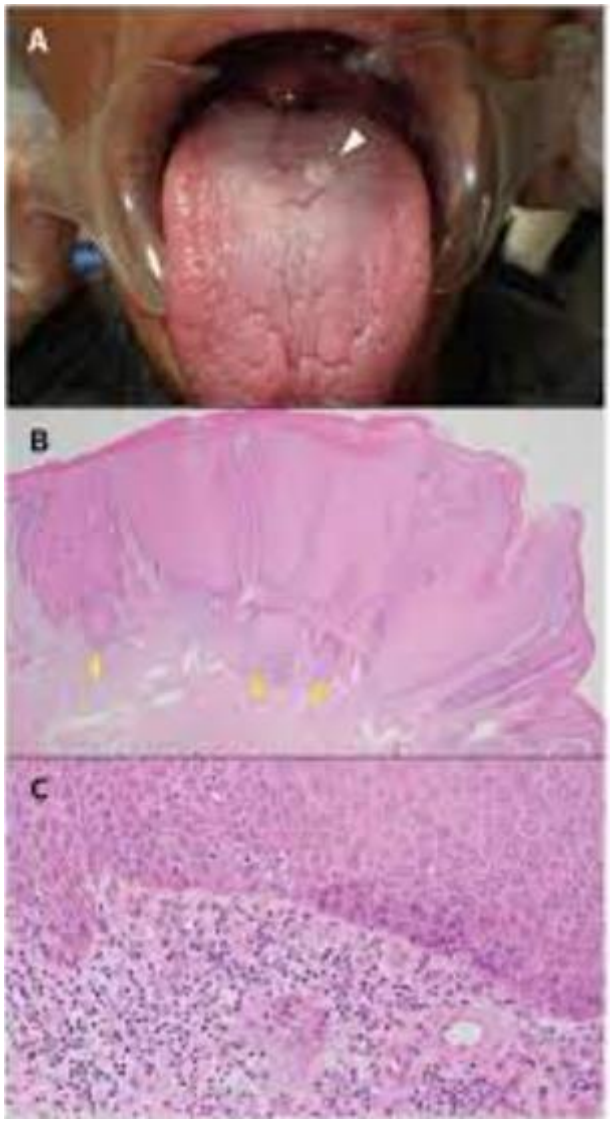

Diagram: Squamous cell carcinoma of the dorsal tongue.

IV. SYMPTOMS

The symptoms of Oral Squamous Cell Carcinoma (OSCC) often develop slowly and may be ignored in the early stages. Common symptoms include.

- **Non-healing ulcers or sores** in the mouth that persist for more than two weeks.
- **White or red patches** (leukoplakia/erythroplakia) on the gums, tongue, or inner cheek.
- **Lump or thickening** in the mouth, jaw, or throat.
- **Pain or burning sensation** in the mouth or throat.
- **Difficulty in chewing, swallowing, or speaking**.
- **Loosening of teeth** or dentures not fitting properly.
- **Swelling in jaw or neck** due to enlarged lymph nodes.
- **Unexplained bleeding** in the mouth.

- In advanced stages: **weight loss, bad breath, and restricted mouth opening (trismus)**. Early recognition of these symptoms is crucial, as timely diagnosis greatly improves treatment outcomes.

V. DIAGNOSIS

The diagnosis of Oral Squamous Cell Carcinoma (OSCC) begins with a **clinical examination** of the mouth to identify suspicious lesions, ulcers, or abnormal growths. If such changes are found, further tests are carried out to confirm cancer and its extent.

Common diagnostic methods include

- **Biopsy:** The most reliable test. A small tissue sample is taken from the lesion and examined under a microscope to confirm the presence of cancer cells.
- **Imaging tests:** X-ray, CT scan, MRI, or PET scan are used to check the spread of cancer to bones, lymph nodes, or distant organs.
- **Endoscopy:** A thin flexible tube with a camera is used to examine deeper areas of the throat and oral cavity.
- **Blood tests:** Performed to assess overall health and detect any organ involvement before treatment.

Early and accurate diagnosis is critical, as OSCC detected in the initial stages has a much better chance of successful treatment and survival.

VI. TREATMENT

The treatment of Oral Squamous Cell Carcinoma (OSCC) depends on the **stage of cancer, location, and overall health** of the patient. A combination of therapies is often used for effective management.

1. Surgery

- The primary treatment for early-stage OSCC.
- Involves removing the tumor along with some surrounding healthy tissue to prevent recurrence.
- Advanced cases may require partial removal of jaw or tongue.

2. Radiation Therapy

- Uses high-energy rays to destroy cancer cells.
- Can be used alone in early stages or after surgery to kill remaining cancer cells.

3. Chemotherapy

- Uses anticancer drugs to target rapidly dividing cells.
- Often combined with radiation (chemoradiation) in advanced stages.

4. Targeted and Immunotherapy

- Newer treatments focus on specific cancer cell pathways or boosting the body's immune response.

5. Herbal / Complementary Therapies

- Certain herbal compounds (e.g., curcumin, green tea extracts) may support treatment and reduce side effects, though they are not a replacement for standard therapy.

VII. RISK FACTORS

Oral Squamous Cell Carcinoma (OSCC) develops due to multiple risk factors, with tobacco being the most significant. Common risk factors include:

- **Tobacco use:** Smoking (cigarettes, bidis) and smokeless forms (gutkha, khaini, betel quid with tobacco).
- **Alcohol consumption:** Increases the risk, especially when combined with tobacco.
- **Poor oral hygiene:** Chronic irritation and infections can contribute to cancer development.
- **Human Papillomavirus (HPV) infection:** Certain HPV strains are linked to oral cancers.
- **Genetic predisposition:** Family history of cancer can increase susceptibility.
- **Dietary factors:** Lack of fruits and vegetables, and exposure to carcinogens.
- **Chronic irritation:** From sharp teeth, ill-fitting dentures, or constant trauma to oral mucosa.

  Understanding these risk factors is crucial for **prevention and early detection** of oral cancer.

VIII. FUTURE SCOPE OF STUDY

The study of Oral Squamous Cell Carcinoma (OSCC) and its link to tobacco use has significant potential for future research and healthcare improvements:

1. **Early Detection Tools:** Development of advanced screening methods, such as salivary biomarkers, AI-based imaging, and non-invasive tests, to detect OSCC at an earlier stage.

2. **Targeted Therapies:** Research on new drugs and immunotherapies that specifically target cancer cells with fewer side effects.
3. **Herbal and Complementary Treatments:** Exploring natural compounds with anticancer properties to support conventional therapies.
4. **Tobacco Control Programs:** Strengthening preventive strategies, public awareness campaigns, and policies to reduce tobacco consumption globally.
5. **Genetic Research:** Studying genetic and molecular mechanisms to identify high-risk individuals and personalized treatment approaches.

   By focusing on these areas, future studies can improve survival rates, reduce morbidity, and enhance quality of life for patients with oral cancer.

IX. CONCLUSION

Oral Squamous Cell Carcinoma (OSCC) is a serious and often preventable form of mouth cancer, with tobacco use being the leading risk factor. Early detection, proper diagnosis, and timely treatment are crucial for improving patient survival and quality of life. While surgery, chemotherapy, radiation, and emerging therapies provide effective management, prevention through reducing tobacco consumption remains the most impactful strategy.

This review highlights the importance of understanding the causes, symptoms, and risk factors of OSCC, as well as the need for public awareness, strong preventive measures, and continued research into advanced detection methods and targeted therapies. By combining prevention, early diagnosis, and innovative treatment approaches, the burden of tobacco-related oral cancer can be significantly reduced.

REFERENCE

1. Jiang, X., et al. (2019). Tobacco and oral squamous cell carcinoma: A review. Journal of Oral Pathology & Medicine, 48(10): 877–884.
2. Eloranta, R., et al. (2024). Oral squamous cell carcinoma: Effect of tobacco and alcohol on cancer location. Tobacco Induced Diseases, 22: 189303.
3. Asthana, S., et al. (2019). Association of smokeless tobacco with oral cancer: A review of systematic reviews. Tobacco Prevention & Cessation, 5: 12.
4. Warnakulasuriya, S. (2005). Tobacco, oral cancer, and treatment of dependence. Oral Oncology, 41(3): 244–260.
5. Schmidt, B. L., et al. (2004). Tobacco smoking history and presentation of oral squamous cell carcinoma. Journal of Oral and Maxillofacial Surgery, 62(3): 335–338.

6. Chamoli, A., et al. (2021). Overview of oral cavity squamous cell carcinoma: Risk factors and molecular mechanisms. Oral Oncology, 116: 105234.
7. Noggle, B., et al. (2024). Oral cancer incidence among adult males with current or former tobacco use. JMIR Cancer, 10(1): e51936.
8. Gray, J. L., et al. (2019). Impact of oral and oropharyngeal cancer diagnosis on smoking cessation. Tobacco Induced Diseases, 17: 55.
9. Rumgay, H., et al. (2024). Global burden of oral cancer in 2022 attributable to tobacco and alcohol consumption. The Lancet Oncology, 25(6): 769–781.
10. Kijowska, J., et al. (2024). Epidemiology, diagnostics, and therapy of oral cancer—Current knowledge and future perspectives. Cancers, 16(18): 3156.
11. Salehiniya, H., et al. (2020). Oral cavity and lip cancer in the world: An epidemiological review. Biomedical Research and Therapy, 7(3): 3884–3891.
12. Tenore, G. C., et al. (2020). Tobacco, alcohol and family history of cancer as risk factors for oral squamous cell carcinoma. Applied Sciences, 10(11): 3896.
13. Van Heest, T., et al. (2022). Persistent tobacco use after treatment for head and neck cancer. JAMA Otolaryngology–Head & Neck Surgery, 148(10): 934–940.
14. Krutz, M., et al. (2022). Tobacco cessation after head and neck cancer diagnosis is associated with improved survival outcomes. Oral Oncology, 128: 105765.
15. Cinciripini, P. M., et al. (2024). Survival outcomes of an early intervention smoking cessation program for head and neck cancer patients. JAMA Oncology, 10(1): 1–9.
16. Jassem, J., et al. (2019). Tobacco smoking after diagnosis of cancer: Clinical aspects. Translational Lung Cancer Research, 8(1): 1–10.
17. Lewin, F., et al. (1998). Smoking tobacco, oral snuff, and alcohol in the etiology of oral and pharyngeal cancer. Cancer, 82(7): 1367–1375.
18. Gross, A. J., et al. (1995). Oral cancer and smokeless tobacco: Literature review. Oral Oncology, 31(5): 305–310.
19. Panta, P., et al. (2021). Invasive oral squamous cell carcinoma induced by smokeless tobacco. Oral Diseases, 27(6): 1392–1399.
20. Warnakulasuriya, S., et al. (2005). Tobacco, oral cancer, and treatment of dependence. Oral Oncology, 41(3): 244–260.
21. Andersen, A. O., et al. (2022). The impact of tobacco smoking on survival of patients with oral squamous cell carcinoma. Acta Odontologica Scandinavica, 80(5): 301–307.
22. Schmidt, B. L., et al. (2004). Tobacco smoking history and presentation of oral squamous cell carcinoma. Journal of Oral and Maxillofacial Surgery, 62(3): 335–338.

23. Chamoli, A., et al. (2021). Overview of oral cavity squamous cell carcinoma: Risk factors and molecular mechanisms. Oral Oncology, 116: 105234.
24. Noggle, B., et al. (2024). Oral cancer incidence among adult males with current or former tobacco use. JMIR Cancer, 10(1): e51936.
25. Gray, J. L., et al. (2019). Impact of oral and oropharyngeal cancer diagnosis on smoking cessation. Tobacco Induced Diseases, 17: 55.
26. Rumgay, H., et al. (2024). Global burden of oral cancer in 2022 attributable to tobacco and alcohol consumption. The Lancet Oncology, 25(6): 769–781.
27. Kijowska, J., et al. (2024). Epidemiology, diagnostics, and therapy of oral cancer—Current knowledge and future perspectives. Cancers, 16(18): 3156.
28. Salehiniya, H., et al. (2020). Oral cavity and lip cancer in the world: An epidemiological review. Biomedical Research and Therapy, 7(3): 3884–3891.
29. Tenore, G. C., et al. (2020). Tobacco, alcohol and family history of cancer as risk factors for oral squamous cell carcinoma. Applied Sciences, 10(11): 3896.
30. Van Heest, T., et al. (2022). Persistent tobacco use after treatment for head and neck cancer. JAMA Otolaryngology–Head & Neck Surgery, 148(10): 934–940.